HARMONY 802.11a WIRELESS APPLICATION NOTE

Creating Ad-Hoc Mobile Networks Using Harmony 802.11a PC Cards

The Harmony 802.11a Demo Kit contains everything you need to quickly and easily set up ad-hoc mobile networks, allowing you to inter-network with your colleagues at wired network speeds.

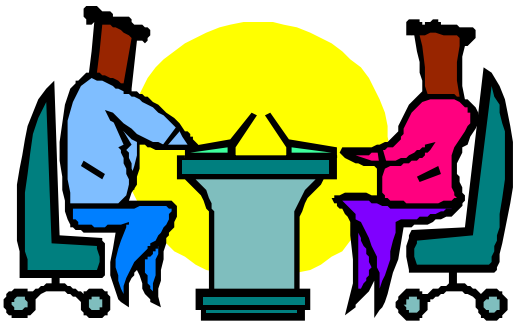
- Share large files, such as PowerPoint presentations, CAD drawings, and spreadsheets.
- Distribute and play multimedia files, such as MPEG-2 videos or MP3 audio playlists, over the network.
- Expedite the transfer or backup of critical files between computers.

Creating a wireless ad-hoc network requires only three (3) simple steps. This document provides details for each of these steps depending on your operating system.

Step 1. Install the Harmony 802.11a PC Card in each notebook and configure them for an ad hoc network.

Step 2. Enable file sharing on the notebook containing the file you need.

Step 3. Browse to the file you need on the remote computer.



Students gather in the library to collaborate on a project before class.

The Harmony 802.11a PC Card is an IEEE 802.11a-compliant CardBus card, offering:

- 54 Mbps data rate in 802.11a mode
- 108 Mbps data rate in Proxim's 2X mode
- Up to 10 times higher data rates at any range than 802.11b
- No interference from cordless phones and microwave ovens
- Longer battery life due to higher energy efficiency

Harmony 802.11a CardBus PC Card

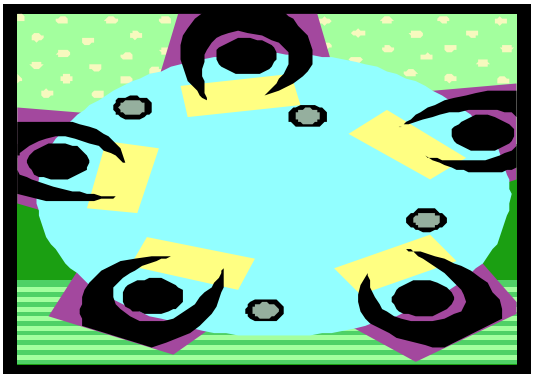
Step 1. Install the Harmony 802.11a PC Card in each notebook and configure them for an ad hoc network.

Insert the Harmony 802.11a PC Card into an available CardBus slot. The computer should recognize the card and offer to search for a driver. Direct the search to look on the supplied CD. After the installation is complete, restart the computer if prompted. Access the 802.11a PC Card's Network Properties screen and configure the **Network Mode** to Ad Hoc and enter an **SSID**. By default the card is in 802.11a mode. If desired, enable the **Turbo mode** for higher speed. After all selections are made, select **<OK>** until the Network Properties window is closed and restart if prompted.

For more details on this installation, refer to the Demo Kit Quick Start Guide included on the CD.

Step 2: Enable file sharing on the notebook containing the file you need.

For Windows 98 Second Edition and Millennium Edition, right-click **Network Neighborhood** (for 98 Second Edition) or **My Network Places** (for Millennium Edition) on the Desktop and select **Properties** from the drop-down list. Verify the following are listed (other items may appear as well): Client for Microsoft Networks, Harmony 802.11a Wireless Network Adapter, TCP/IP, and File and Printer Sharing for Microsoft Networks. Click the **<File and Printer Sharing…>** button and choose **I want to be able to give others access to my files** if not already selected. Click **<OK>** and restart the computer if prompted. Next, navigate to the location of the file you would like to share. Right-click the files folder or drive and select **Sharing** from the drop-down menu. Select **Shared As** and enter a new Share Name if you do not want to use the default name. Click **<OK>** to return to the Windows desktop.



Accountants update spreadsheets at a customer site during an audit.

For Windows 2000, right-click **My Network Places** on the Desktop and select **Properties** from the drop-down list. If more than one Network Connection is shown, highlight each one until you see the "Harmony 802.11a Wireless Network Adapter" description. Then right-click the Harmony 802.11a Wireless Network Adapter connection and select **Properties** from the drop-down list. Verify that the following are listed (other items may appear as well): Client for Microsoft Networks, File and Printer Sharing for Microsoft Networks, and Internet Protocol (TCP/IP). Once these items are confirmed, navigate to the location of the file you would like to share. Right-click the files folder or drive and choose Sharing from the drop-down list. Select Share this folder and click **<OK>**.

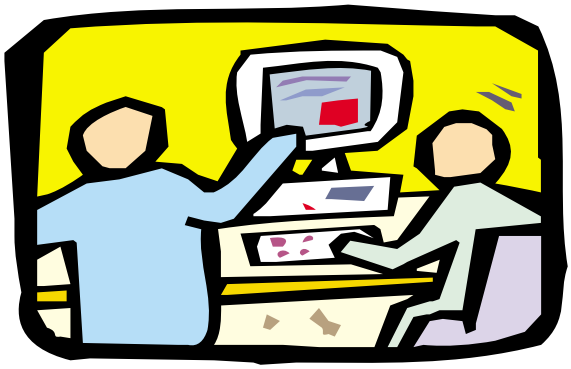
Finally, you need to confirm that the username for the person on the remote computer accessing this file is located in your Local User Group. From the Control Panel, select **Administrative Tools > Computer Management > Local Users and Groups**. Then click **Users**. If the username does not appear in the list, click **Action > New User** and add them to the list. Note that the user's password must match the password entered when the user logs onto the remote notebook

Step 3: Browse to the file you need on the remote computer.

For Windows 98 Second Edition, click **Start > Find > Computer**. Enter the name of the Computer that contains the file you need and click **<Search Now>**. If you don't know the name of the computer, please see below. Once the computer is located, browse to the location where the file you need is located on the remote computer.

For Windows 2000 and Millennium Edition, click **Start > Search > For Files or Folders**, and in the left pane click **Computers**. Enter the name of the Computer that contains the file you need and click **<Search Now>**. If you don't know the name of the computer, please see below. Once the computer is located, browse to the location where the file you need is located on the remote computer.

To determine the computer name of a particular computer, right-click **My Network Places** (for Windows Millennium or 2000) or **Network Neighborhood** (for Windows 98 Second Edition) and select **Properties**. For Windows 2000, click **Network Identification** on the lower left side of the window. For Windows 98 Second Edition or Millennium Edition, click the **Identification** tab.



Engineering teams meet to review CAD files prior to a design review

Performance Evaluation

Throughput

The performance of any wireless LAN is highly subject to environmental conditions. Numerous factors, such as materials of construction, reflecting surfaces, obstructions, etc. will affect the throughput of radio-based communications such as a wireless LAN link. It is therefore difficult to quantify the performance of any wireless product.

Nonetheless, you may want to evaluate the throughput performance of your Harmony 802.11a network for purposes of comparison with other wireless LAN products or to assess its behavior in different locations.

Various standard networking tools exist that can help you qualify the performance of your ad-hoc network without investing in expensive networking utilities.

NetIQ's **QCheck** is a simple network testing utility, which provides a basic throughput test. You can download a free copy from the NetIQ web site at http://www.netiq.com/qcheck/.

This utility needs to be installed on each computer that will be part of the test. Select **Local Host** in the drop-down box for Endpoint 1 and enter the IP address of the remote computer in the Endpoint 2 box. Change the Data Size to 1000 kBytes and run the test several times in a row by pressing the <Run> button after each test is completed.

QCheck network testing utility

QCheck will report the throughput for each test in Mbps. Note, however, that the maximum data size QCheck allows is only 1 MB. This data size limitation does not demonstrate the significant throughput advantage of the Harmony 802.11a PC Card, as would a larger data size.

Examples of other methods that can be used to evaluate the throughput difference between the Harmony 802.11a PC Card and any other wireless LAN technologies include:

- Perform FTP file transfers of files in excess of, for example, 50 Mbps, and monitor the throughput reported by the FTP client

- Transfer high-resolution MPEG-2 video files (e.g., 22 Mbps) and compare the video and audio quality on the media player

Managers consolidate slide show materials before a sales presentation

Throughput vs. Radio Rate

With all wireless LAN products, the useable throughput you will experience does not equal the radio rate. Due to the fixed overhead associated with managing over-the-air data transmission, all wireless LANs experience actual throughput of 30 to 50% of the radio rate. Therefore, in order to increase user throughput, it is necessary to maximize the radio rate; your Harmony 802.11a PC Cards offer the highest radio rate available in a wireless LAN product!

Range

The data rate of 108 Mbps should be obtainable within a range of approximately 20 feet in a typical open indoor environment, for example within a conference room. As the Harmony 802.11a PC Cards are moved to greater distances or obstructions, such as walls, are introduced, the radio will automatically start backing off to lower data rates. Because of this automatic back-off mechanism, the 802.11a cards will continually maintain the highest data rate possible at that range.

In general, the 802.11a cards will consistently maintain a data rate, at any range, of 3 to 10 times higher than 802.11b products. For example, if the range of an 802.11b product at 11 Mbps is 100 feet in the given environment (before backing off to 5.5 Mbps), the 802.11a PC cards, in the same environment, may have backed off from 108 Mbps to 96 Mbps to 72 Mbps, but will still be over 6 times faster at that distance than 802.11b (72 Mbps vs. 11 Mbps).

Again, keep in mind that all wireless LANs are highly subject to environment conditions and that the LAN's performance in your environment may differ from the examples discussed.

802.11a Mode vs. 2X Mode

The Harmony 802.11a PC Card is capable of operating in two modes: 802.11a Mode and 2X Mode. In 802.11a Mode, the default mode, the maximum data rate is 54 Mbps and the card will be interoperable with other 802.11a-compliant products.

In order to experience 100 Mbps networking, it is necessary to configure your Harmony 802.11a PC Card for Proxim's 2X Mode (also referred to as Turbo Mode). In this mode, the maximum data rate is 108 Mbps. When in 2X Mode, the Harmony 802.11a PC Card is not interoperable with other 802.11a products.

Refer to the Demo Kit Quick Start Guide for instructions on configuring your Harmony 802.11a PC Card for 2X Mode.

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